Replacement Sheet 1 of 22
Appl. No. 09/882,285; Filed: Jun 18, 2001
Dkt No. 1778.0210000; Group Unit: 2111
Inventors: Kissell et al.
Tel. No.: 202-371-2600
For: Instruction Specified Register Value Saving in Allocated Caller Stack or Not Yet Allocated Callee Stack (as amended)

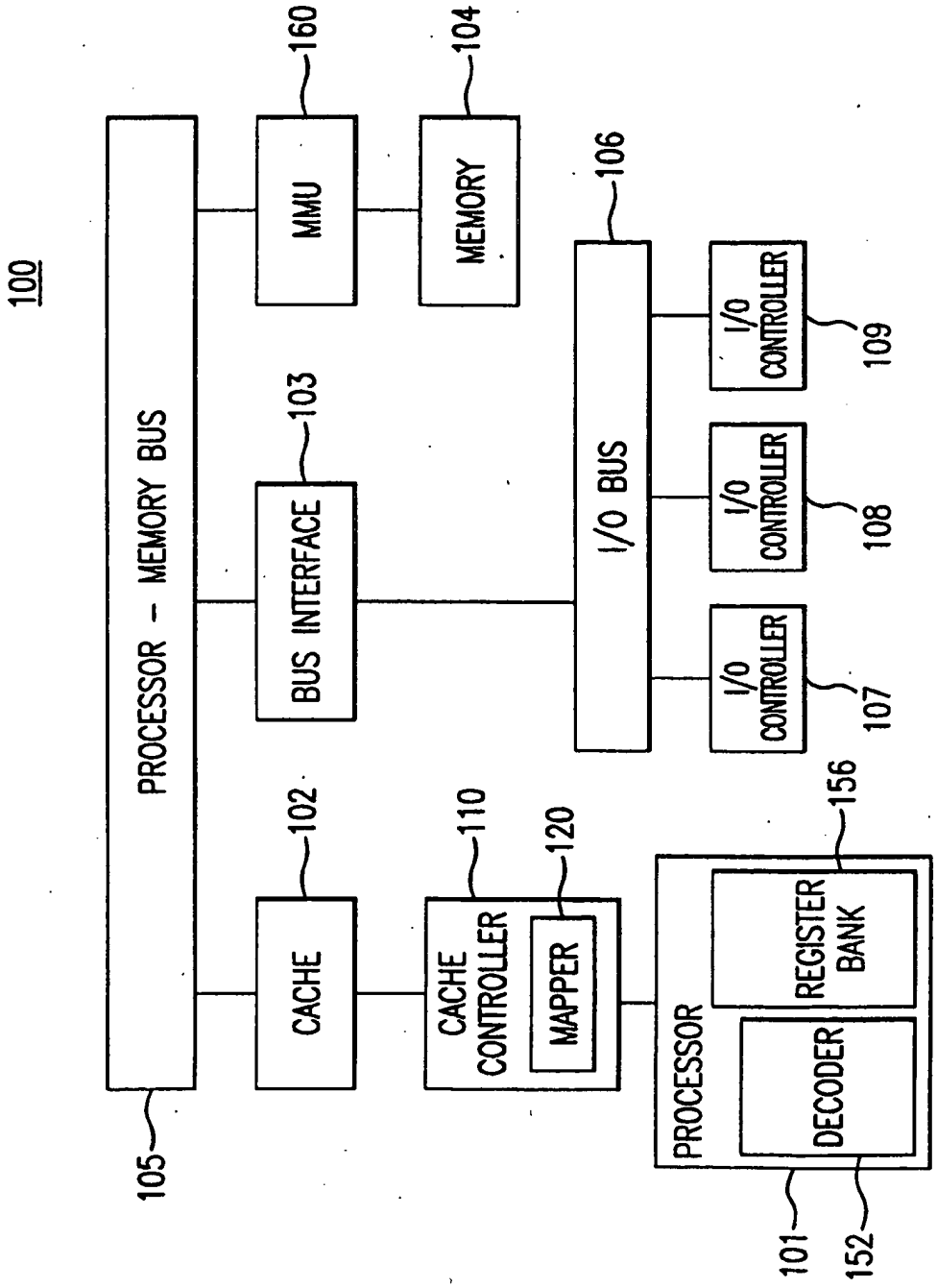

FIG. 1

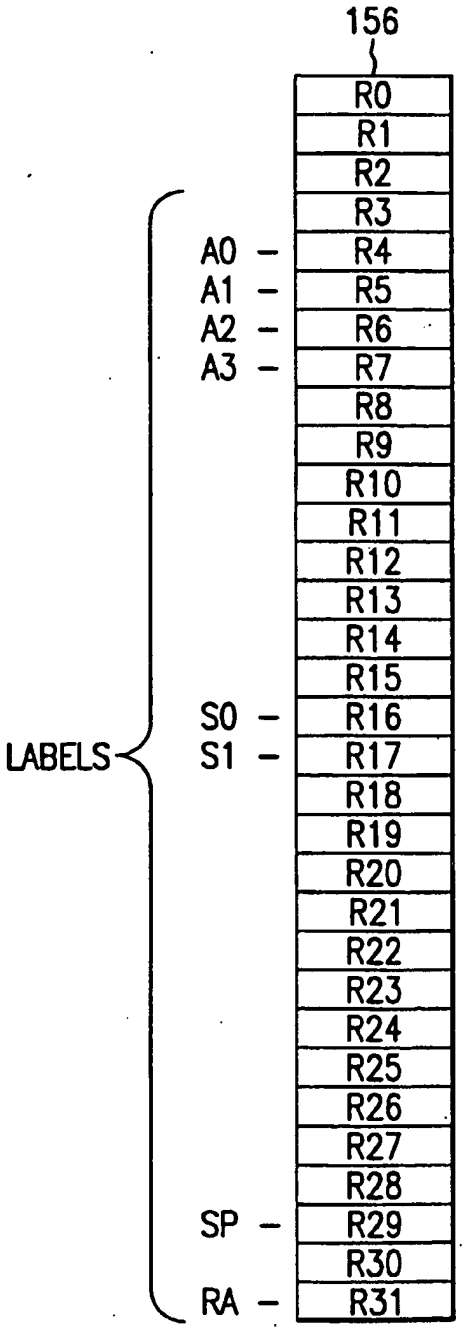

FIG. 2

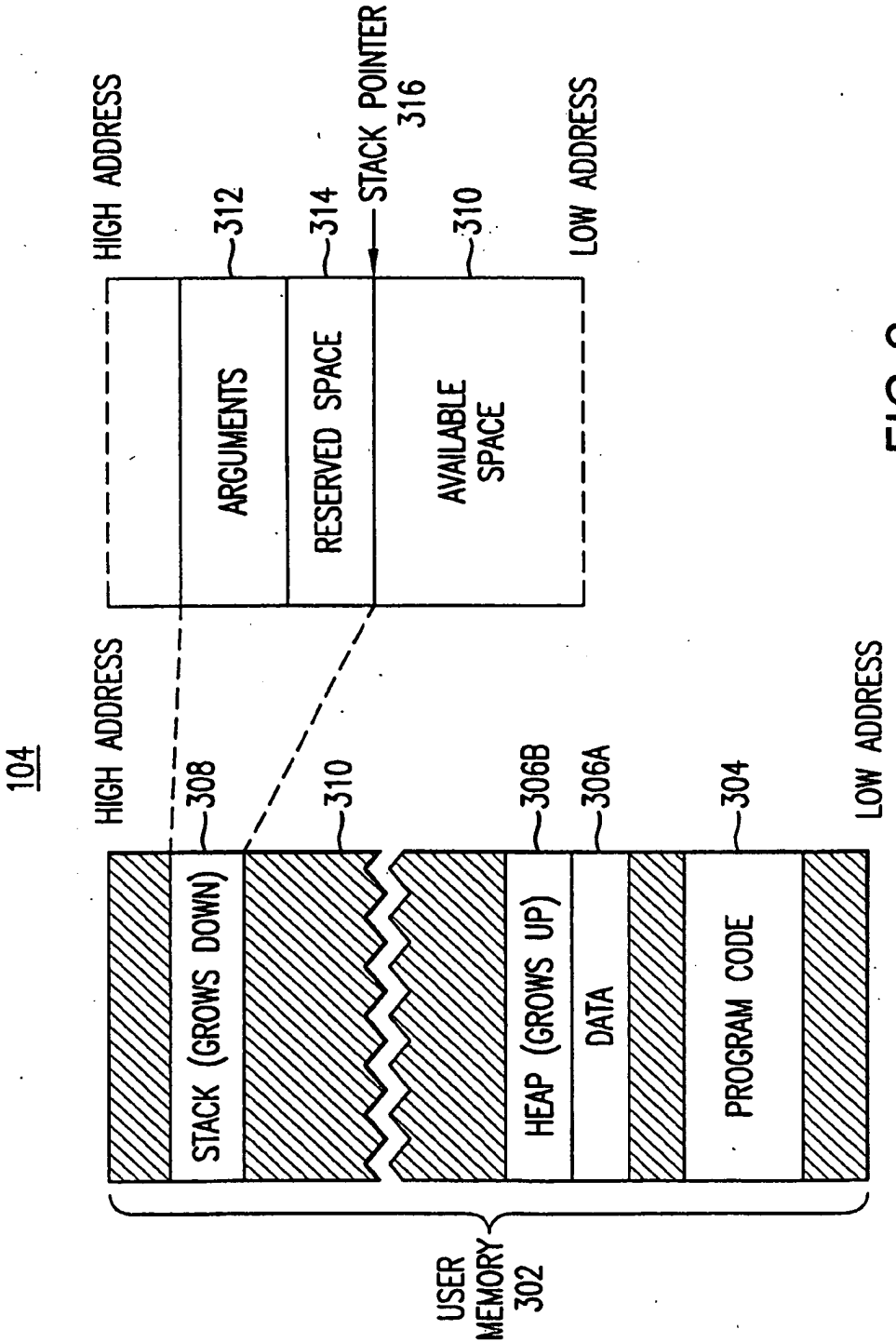

FIG.3

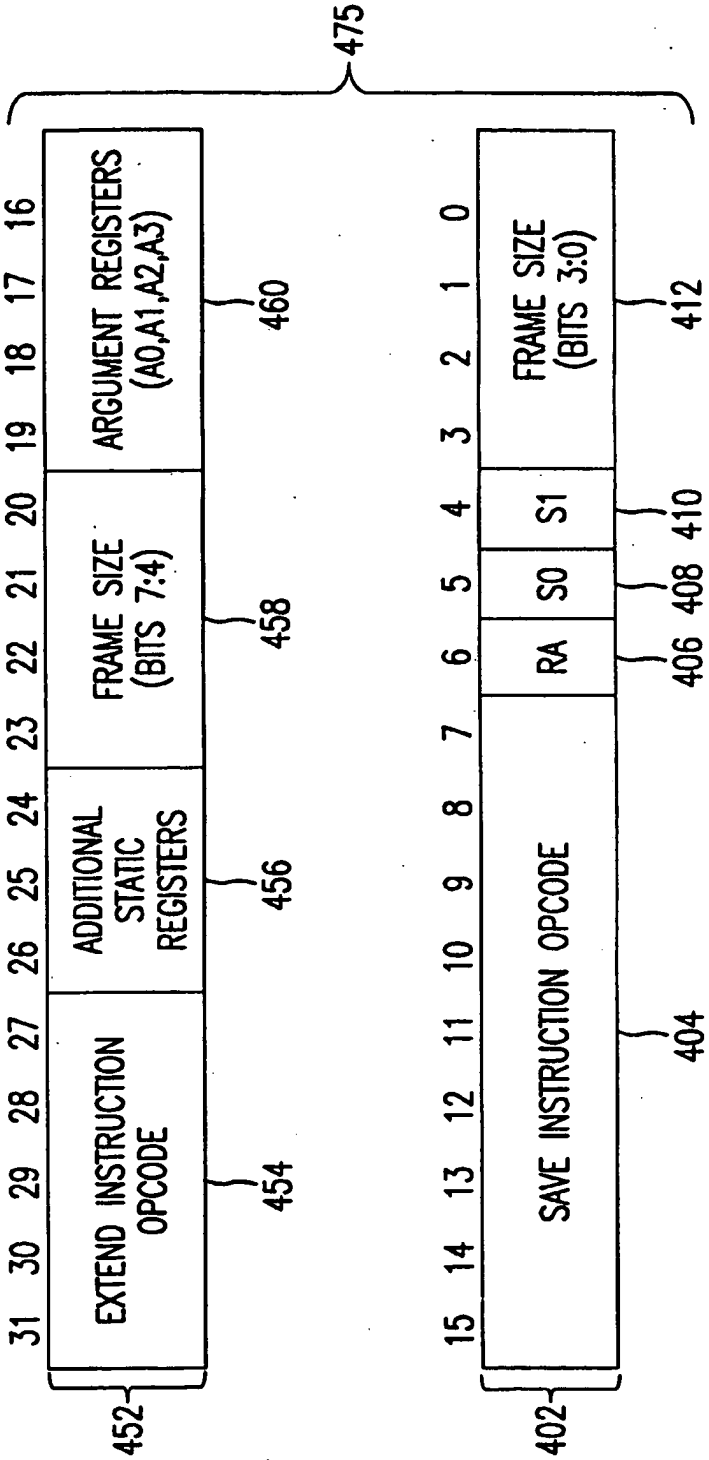

FIG.4

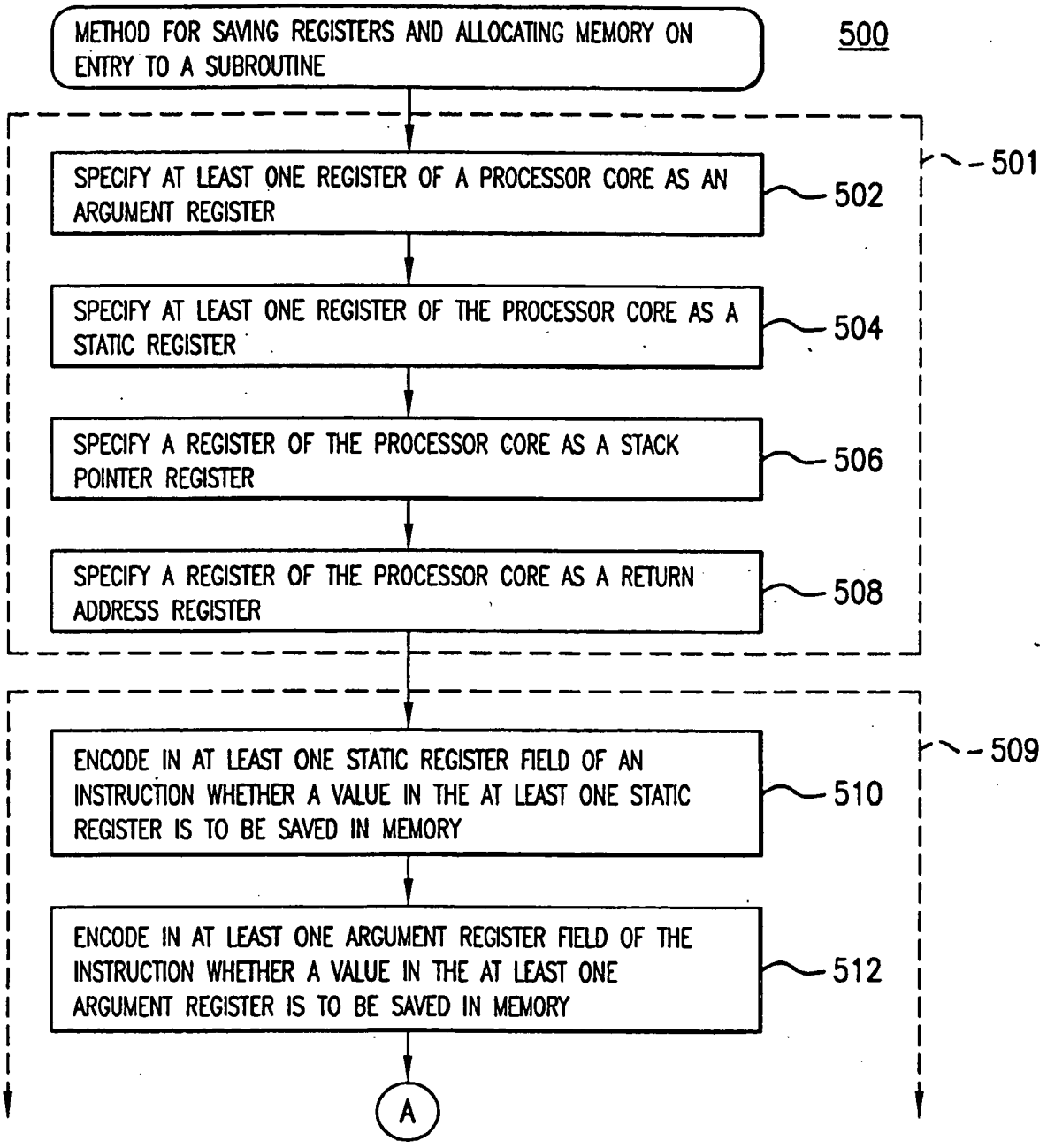

FIG.5A

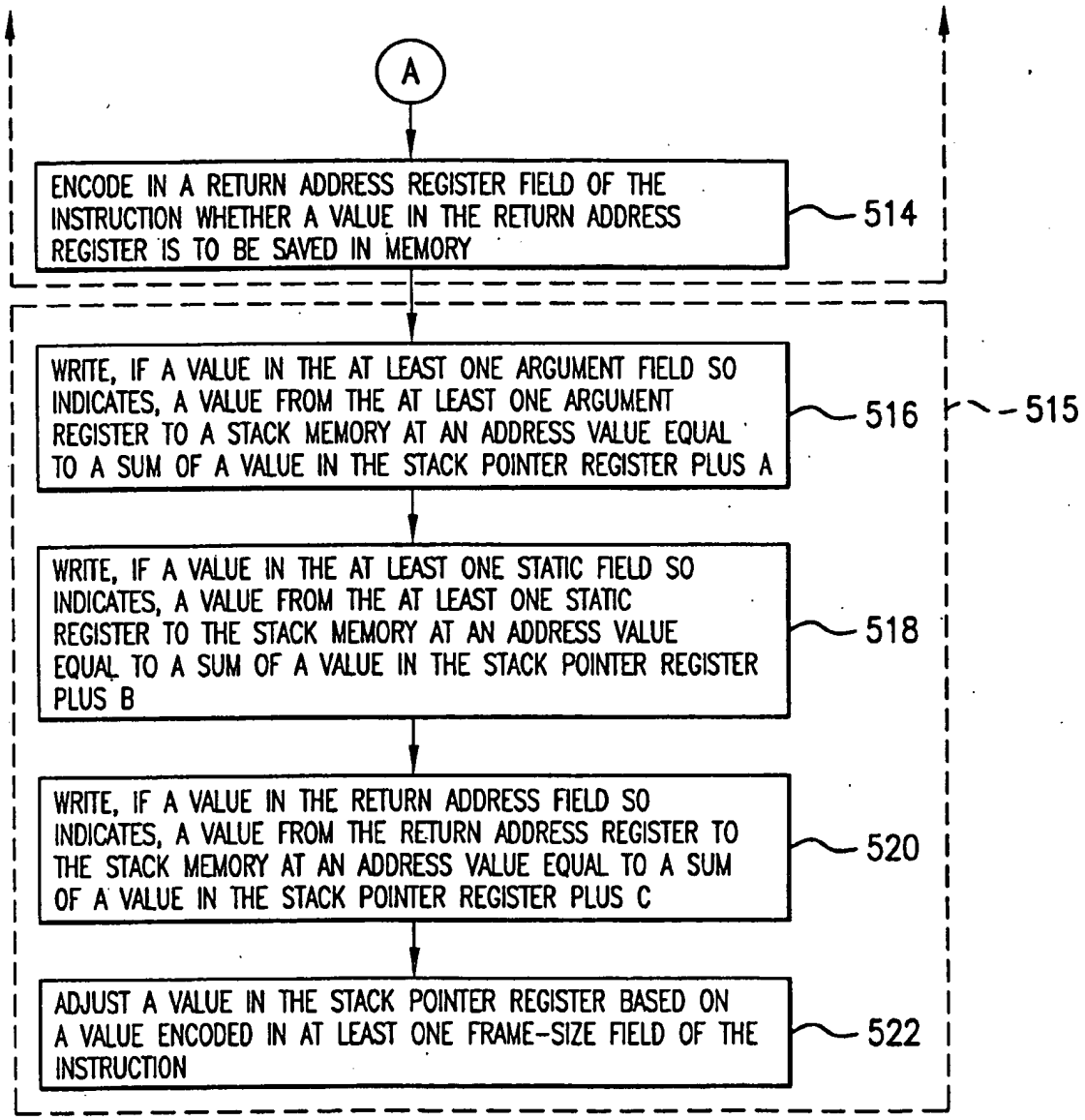

FIG.5B

650

SAVE INSTRUCTION

```
temp ← GPR[29]
if ra = 1 then
        temp ← temp - 4
        VirtualMemory[temp] ← GPR[31]
endif
if s1 = 1 then
        temp ← temp - 4
        VirtualMemory[temp] ← GPR[17]
endif
if s0 = 1 then
        temp ← temp - 4
        VirtualMemory[temp] ← GPR[16]
endif
if framesize = 0 then
        temp ← GPR[29] - 128
else
        temp ← GPR[29] - (0 || (framesize << 3))
endif
GPR[29] ← temp
```

FIG.6

aregs ENCODING (BINARY)	REGISTERS SAVED AS ARGUMENTS	REGISTERS RESTORED AS STATICREGISTERS
0000	NONE	NONE
0001	NONE	GPR[7]
0010	NONE	GPR[6], GPR[7]
0011	NONE	GPR[5], GPR[6], GPR[7]
1011	NONE	GPR[4], GPR[5], GPR[6], GPR[7]
0100	a0	NONE
0101	a0	GPR[7]
0110	a0	GPR[6], GPR[7]
0111	a0	GPR[5], GPR[6], GPR[7]
1000	a0, a1	NONE
1001	a0, a1	GPR[7]
1010	a0, a1	GPR[6], GPR[7]
1100	a0, a1, a2	NONE
1101	a0, a1, a2	GPR[7]
1110	a0, a1, a2, a3	NONE
1111	RESERVED	RESERVED

FIG.7

800

EXTENDED SAVE INSTRUCTION

```
temp ← GPR[29]
temp2 ← GPR[29]
case aregs of
    2#0000 2#0001 2#0010 2#0011 2#1011: args ← 0
    2#0100 2#0101 2#0110 2#0111: args ← 1
    2#1000 2#1001 2#1010: args ← 2
    2#1100 2#1101: args ← 3
    2#1110: args ← 4
    otherwise: UNPREDICTABLE
endcase
if args > 0 then
    VirtualMemory [temp] ← GPR[4]
    if args > 1 then
        VirtualMemory[temp + 4] ← GPR[5]
        if args > 2 then
            VirtualMemory [temp + 8] ← GPR[6]
            if args > 3 then
                VirtualMemory [temp + 12] ← GPR[7]
            endif
        endif
    endif
endif
if ro = 1 then
    temp ← temp - 4
    VirtualMemory[temp] ← GPR[31]
endif
if xsregs > 0 then
    if xsregs > 1 then
        if xsregs > 2 then
            if xsregs > 3 then
                if xsregs > 4 then
                    if xsregs > 5 then
                        if xsregs > 6 then
                            temp ← temp - 4
                            VirtualMemory[temp] ← GPR[30]
                        endif
                        temp ← temp - 4
                        VirtualMemory[temp] ← GPR[23]
                    endif
                    temp ← temp - 4
                    VirtualMemory[temp] ← GPR[22]
                endif
                temp ← temp - 4
                VirtualMemory[temp] ← GPR[21]
            endif
```

FIG.8A

EXTENDED SAVE INSTRUCTION

```
                temp ← temp - 4
                VirtualMemory[temp] ← GPR[20]
            endif
            temp ← temp - 4
            VirtualMemory[temp] ← GPR[19]
        endif
        temp ← temp - 4
        VirtualMemory[temp] ← GPR[18]
endif
if s1 = 1 then
        temp ← temp - 4
        VirtualMemory[temp] ← GPR[17]
endif
if s0 = 1 then
        temp ← temp - 4
        VirtualMemory[temp] ← GPR[16]
endif
case aregs of
        2#0000 2#0100 2#1000 2#1100 2#1110: astatic ← 0
        2#0001 2#0101 2#1001 2#1101: astatic ← 1
        2#0010 2#0110 2#1010: astatic ← 2
        2#0011 2#0111: astatic ← 3
        2#1011: astatic ← 4
        otherwise: UNPREDICTABLE
endcase
if astatic > 0 then
        temp ← temp - 4
        VirtualMemory[temp] ← GPR[7]
        if astatic > 1 then
            temp ← temp - 4
            VirtualMemory[temp] ← GPR[6]
            if astatic > 2 then
                temp ← temp - 4
                VirtualMemory[temp] ← GPR[5]
                if astatic > 3 then
                    temp ← temp - 4
                    VirtualMemory[temp] ← GPR[4]
                endif
            endif
        endif
endif
temp ← temp2 - (0 || (framesize << 3))
GPR[29] ← temp
```

FIG.8B

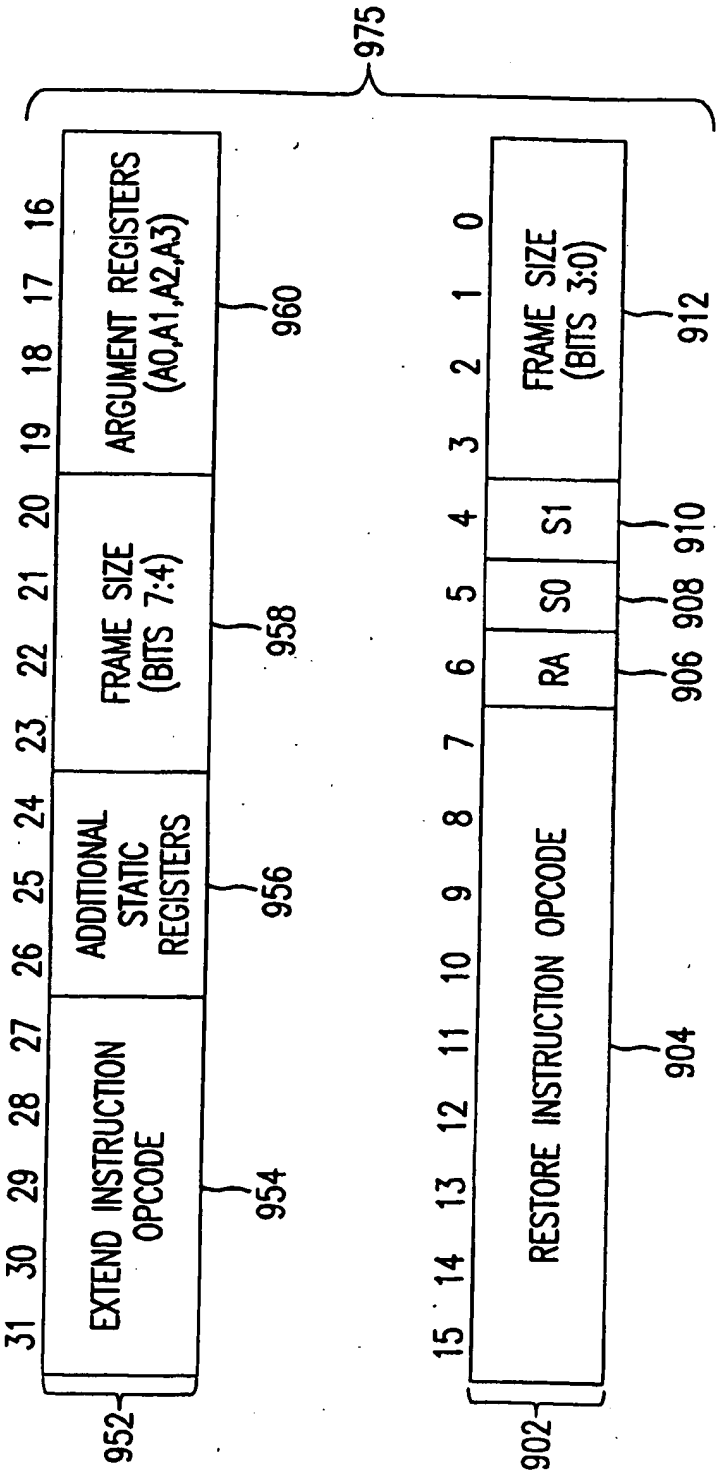

FIG.9

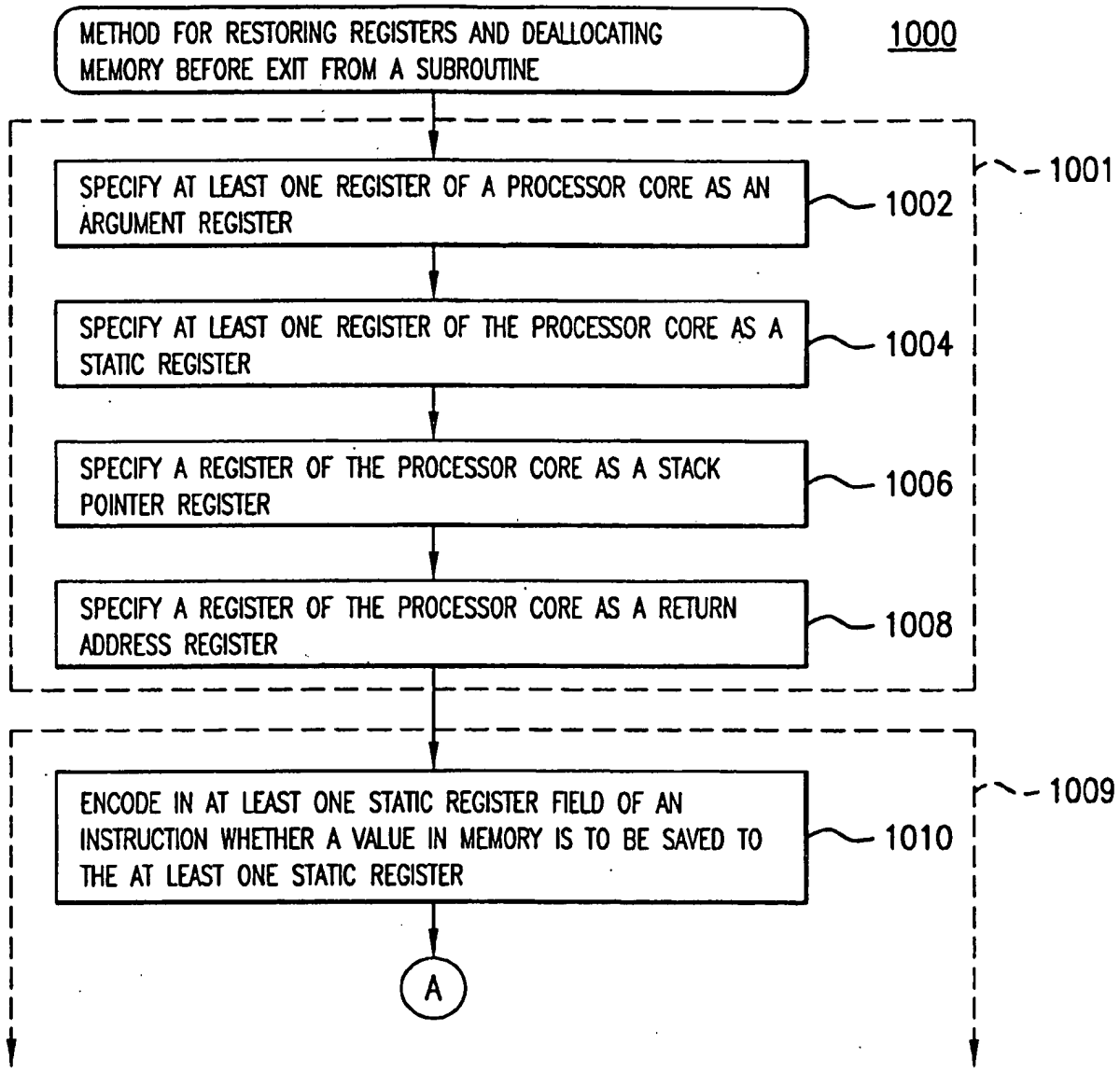

FIG.10A

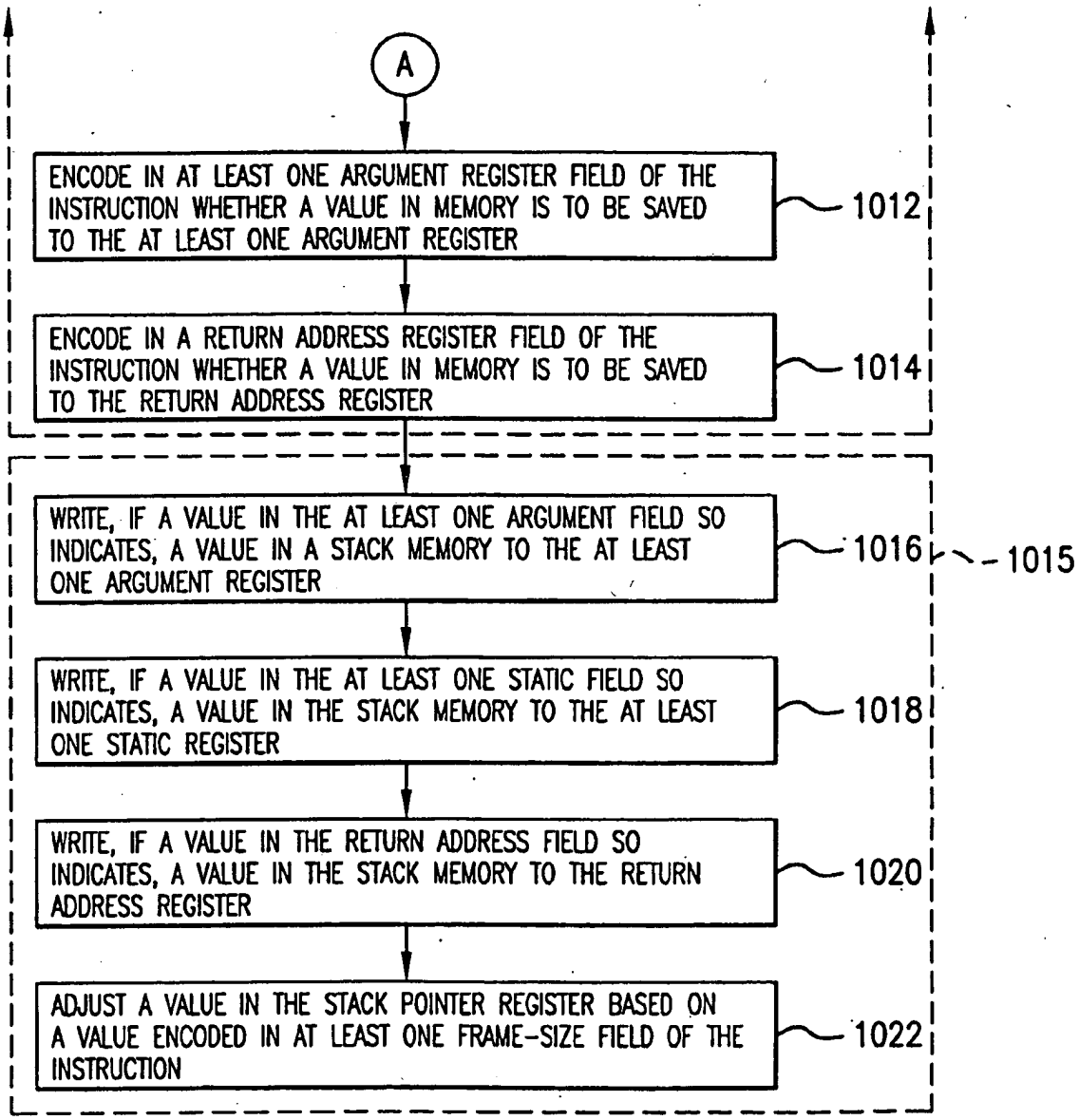

FIG. 10B

1100

RESTORE INSTRUCTION

```
if framesize = 0 then
    temp ← GPR[29] + 128
else
    temp ← GPR[29] + (0 || (framesize << 3))
endif
temp2 ← temp
if ra = 1 then
    temp ← temp - 4
    GPR[31] ← VirtualMemory[temp]
endif
if s1 = 1 then
    temp ← temp - 4
    GPR[17] ← VirtualMemory[temp]
endif
if s0 = 1 then
    temp ← temp - 4
    GPR[16] ← VirtualMemory[temp]
endif
GPR[29] ← temp2
```

FIG. 11

1200

EXTENDED RESTORE INSTRUCTION

```
temp ← GPR[29] + (0 || (FRAMESIZE << 3))
temp2 ← temp
if ra = 1 then
    temp ← temp - 4
    GPR[31] ← VirtualMemory[temp]
endif
if xsregs > 0 then
    if xsregs > 1 then
        if xsregs > 2 then
            if xsregs > 3 then
                if xsregs > 4 then
                    if xsregs > 5 then
                        if xsregs > 6 then
                            temp ← temp - 4
                            GPR[30] ← VirtualMemory[temp]
                        endif
                        temp ← temp - 4
                        GPR[23] ← VirtualMemory[temp]
                    endif
                    temp ← temp - 4
                    GPR[22] ← VirtualMemory[temp]
                endif
                temp ← temp - 4
                GPR[21] ← VirtualMemory[temp]
            endif
            temp ← temp - 4
            GPR[20] ← VirtualMemory[temp]
        endif
        temp ← temp - 4
        GPR[19] ← VirtualMemory[temp]
    endif
    temp ← temp - 4
    GPR[18] ← VirtualMemory[temp]
endif
```

FIG.12A

EXTENDED RESTORE INSTRUCTION

```
if s1 = 1 then
    temp ← temp - 4
    GPR[17] ← VirtualMemory[temp]
endif
if s0 = 1 then
    temp ← temp - 4
    GPR[16] ← VirtualMemory[temp]
endif
case aregs of
    2#0000 2#0100 2#1000 2#1100 2#1110: astatic ← 0
    2#0001 2#0101 2#1001 2#1101: astatic ← 1
    2#0010 2#0110 2#1010: astatic ← 2
    2#0011 2#0111: astatic ← 3
    2#1011: astatic ← 4
    otherwise: UNPREDICTABLE
endcase
if astatic > 0 then
    temp ← temp - 4
    GPR[7] ← VirtualMemory[temp]
    if astatic > 1 then
        temp ← temp - 4
        GPR[6] ← VirtualMemory[temp]
        if astatic > 2 then
            temp ← temp - 4
            GPR[5] ← VirtualMemory[temp]
            if astatic > 3 then
                temp ← temp - 4
                GPR[4] ← VirtualMemory[temp]
            endif
        endif
    endif
endif
GPR[29] ← temp2
```

FIG.12B

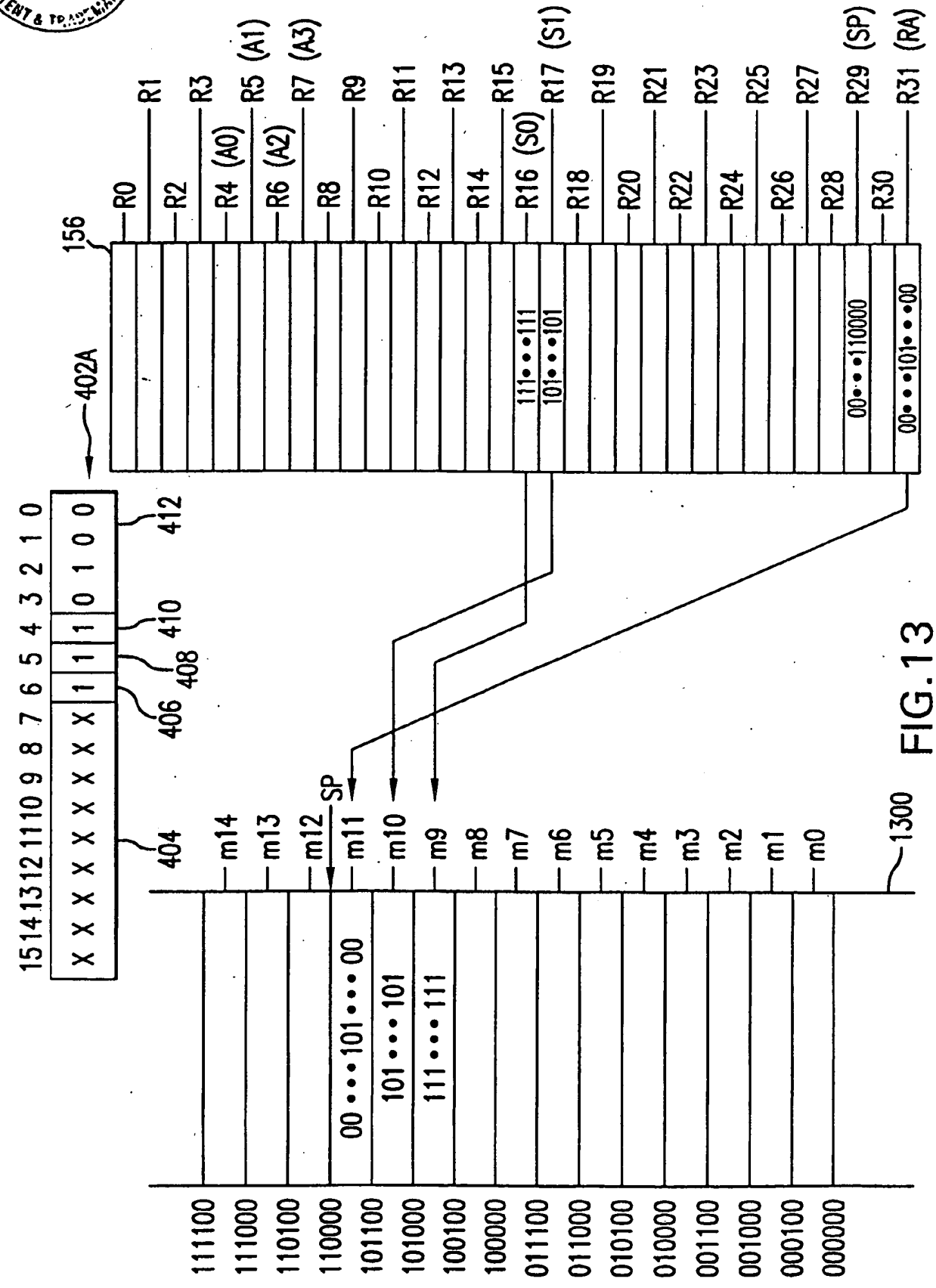

FIG. 13

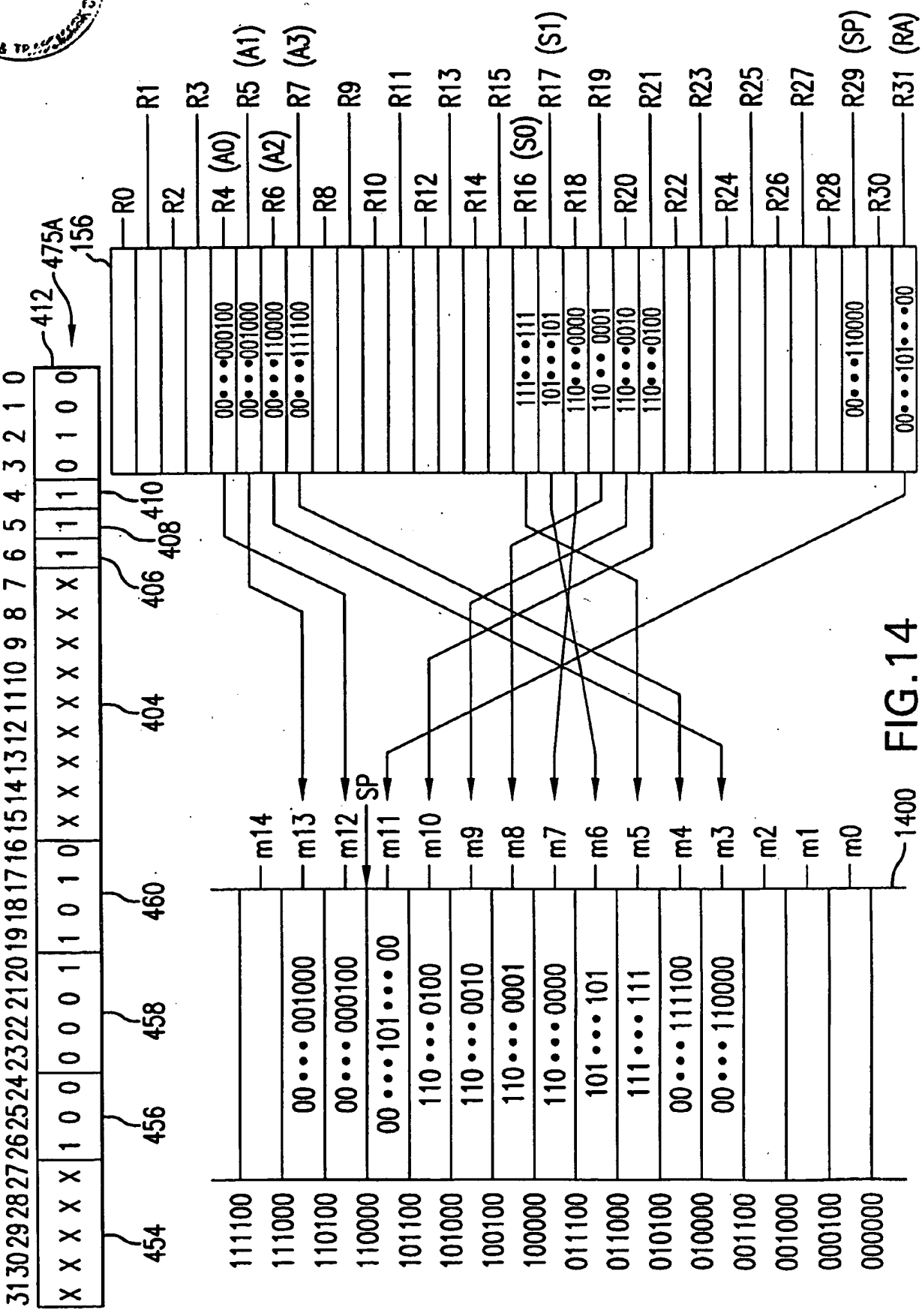

FIG.14

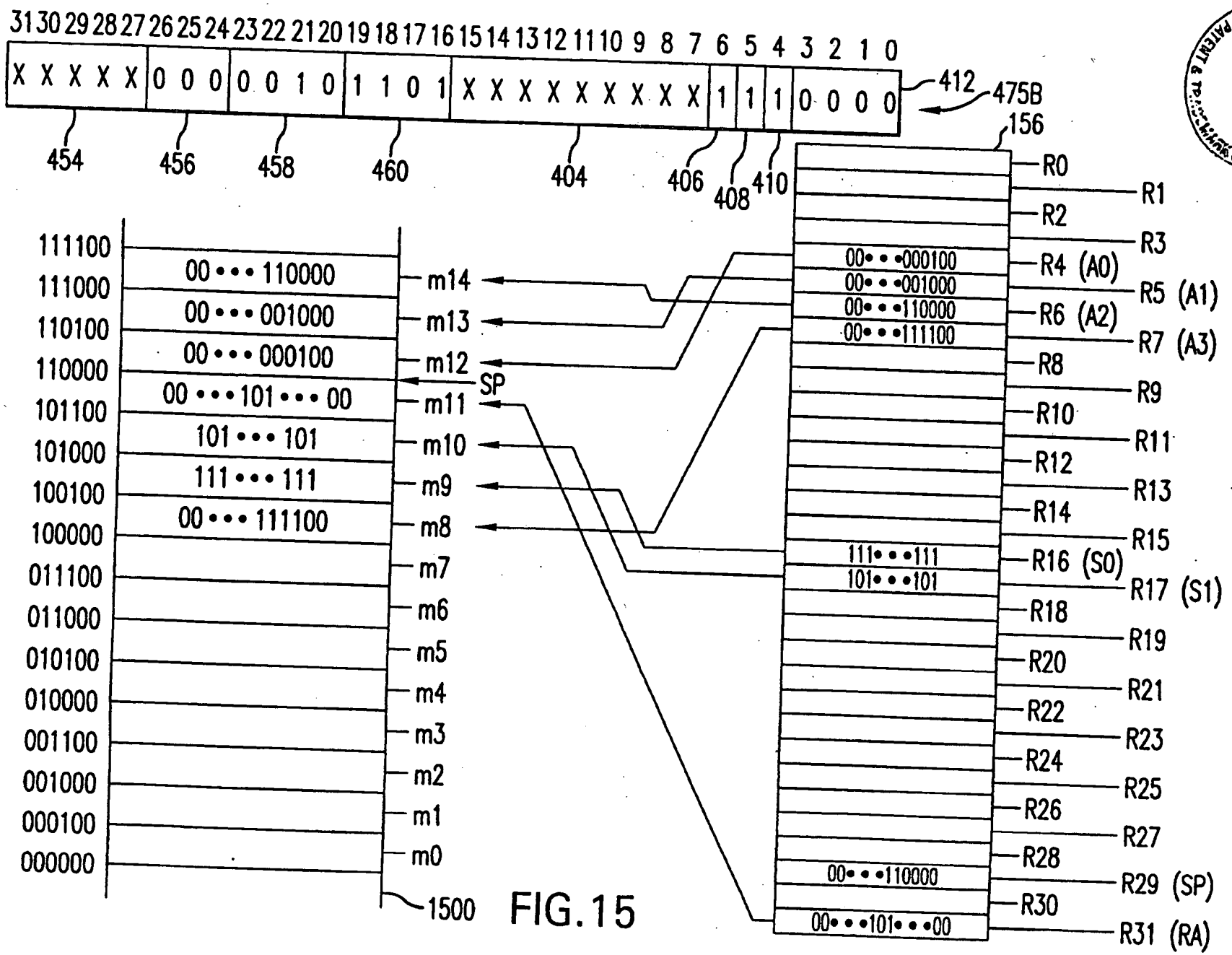

FIG. 15

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Appl. No. 09/882,285; Filed: Jun 18, 2001
Dkt No. 1778.0210000; Group Unit: 2111
Inventors: Kissell et al.
Tel. No.: 202-371-2600
For: Instruction Specified Register Value Saving in Allocated Caller Stack or Not Yet Allocated Callee Stack (as amended)

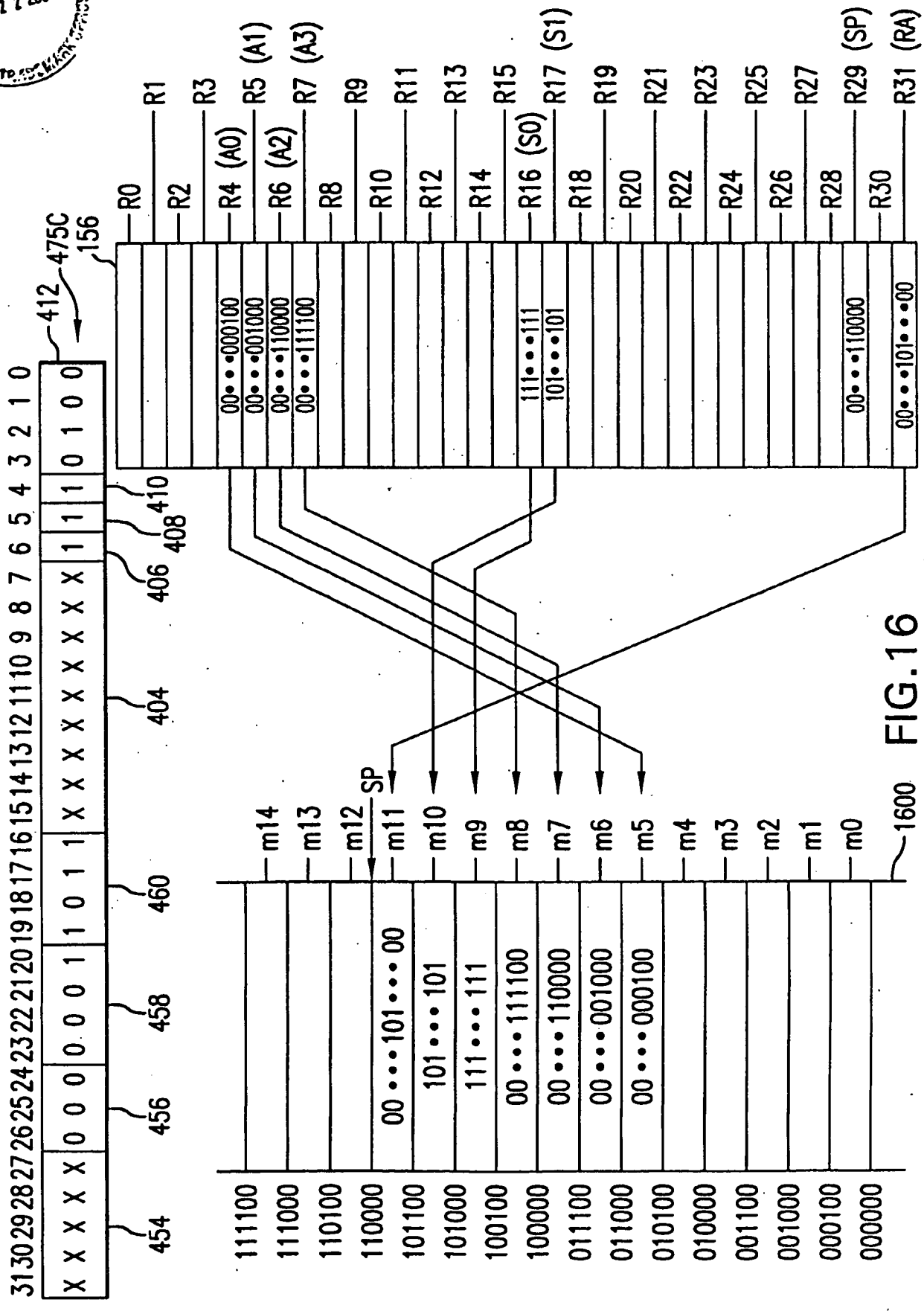

FIG.16

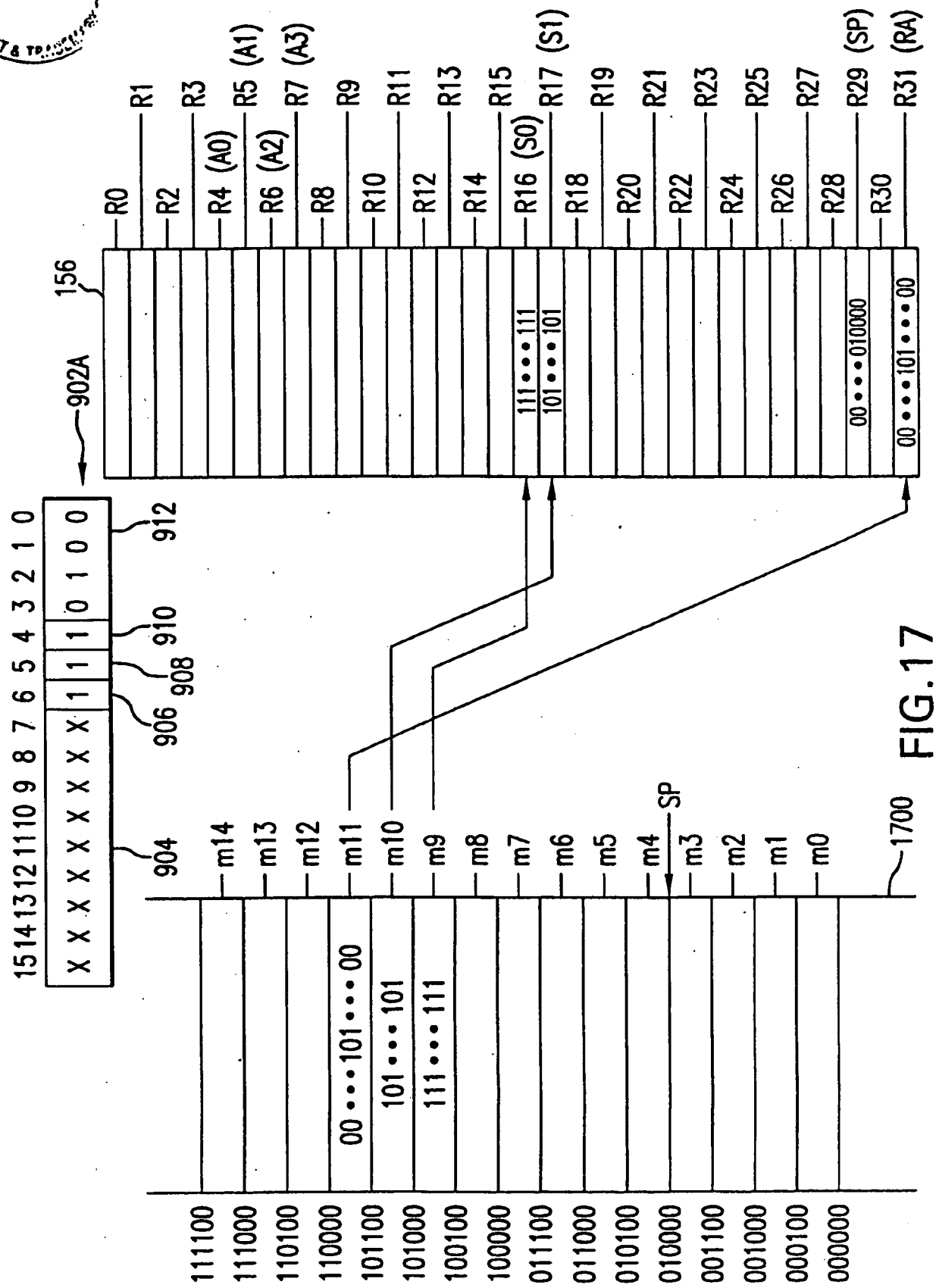

FIG. 17

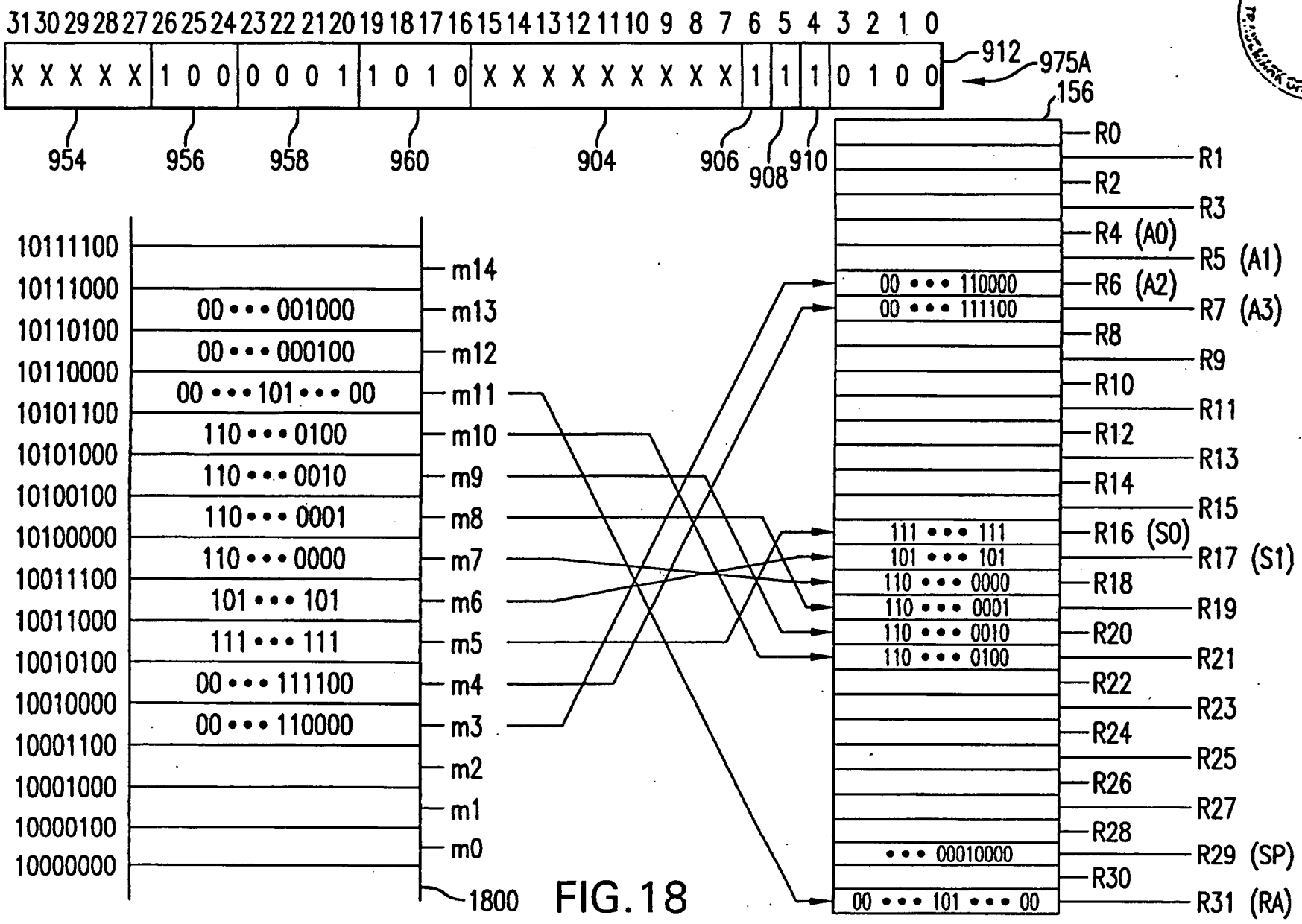

FIG. 18

Replacement Sheet 22 of 22
Appl. No. 09/882,285; Filed: Jun 18, 200
Dkt No. 1778.0210000; Group Unit: 2111
Inventors: Kissell et al.
Tel. No.: 202-371-2600
For: Instruction Specified Register Value Saving in Allocated Caller Stack or Not Yet Allocated Callee Stack (as amended)